

CHAPTER 13: UTILITY IMPACT ANALYSIS

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CHAPTER 13: UTILITY IMPACT ANALYSIS

13.1 INTRODUCTION

For the Notice of Proposed Rulemaking (NPR), the Department will analyze the effects of distribution transformer candidate standard levels on the electric utility industry, using a variant of the U.S. DOE/Energy Information Administration (EIA)'s National Energy Modeling System (NEMS).¹ The NEMS is a large, multi-sectoral, partial equilibrium model of the U.S. energy sector. The DOE/EIA uses NEMS to produce the *Annual Energy Outlook 2003* (AEO2003).² NEMS produces a widely recognized baseline energy forecast for the U.S. through 2025, and is available in the public domain. The Department will use a variant known as NEMS-BT,^a as well as some additional calculations, to provide key inputs to the analysis.

The utility impact analysis considers the lost revenue and avoided equipment investment associated with the electricity savings created by transformer efficiency standards. This analysis will consist of a comparison between model results for the base case and for cases in which proposed standards are in place. The utility impact analysis will report the changes in installed capacity and generation (i.e., avoided equipment investment), by fuel type, that result for each candidate standard level, as well as changes in electricity sales (i.e., lost revenue). The life-cycle cost (LCC) analysis considers the impact on electric utilities as consumers of distribution transformers due to energy-efficiency standards (see Chapter 8). The Department does not consider financial impacts on electric utilities from deregulation in the utility impact analysis.

The use of NEMS-BT for the utility impact analysis offers advantages:

- NEMS is the official DOE energy forecasting model.
- NEMS relies on a set of assumptions that are transparent and have received wide exposure and commentary.
- NEMS allows an estimate of the interactions between the various energy supply and demand sectors and the economy as a whole.

The Department conducts the utility impact analysis as a policy deviation from the AEO2003, applying the same basic set of assumptions that are integral to the AEO2003. For example, the operating characteristics (e.g., energy conversion efficiency, emissions rates) of future electricity generating plants are as specified in the AEO2003 reference case, as are the

^a For more information on NEMS, please refer to the U.S. Department of Energy, Energy Information Administration documentation. A useful summary is *National Energy Modeling System: An Overview 2003*, DOE/EIA-0581(2003). DOE/EIA approves use of the name NEMS to describe only an official version of the model without any modification to code or data. Because this analysis entails some minor code modifications and the model is run under various policy scenarios that are variations on DOE/EIA assumptions, we refer to it as NEMS-BT (BT is DOE's Building Technologies Program).

prospects for natural gas supply. The fundamental policy deviation from the *AEO2003* base case involves the adoption of potential standards for distribution transformers.

The Department also will explore deviations from some of the reference case assumptions, to represent alternative futures. Two alternative futures use the high and low economic growth cases of *AEO2003*. (The reference case corresponds to medium growth.) The high economic growth case assumes higher projected growth rates for population, labor force, and labor productivity, resulting in lower predicted inflation and interest rates relative to the reference case and higher overall aggregate economic growth. The opposite is true for the low growth case. The high growth case predicts growth in per capita GDP of 2.5 percent per year, compared with 2.2 percent per year in the reference case, and 1.9 percent per year in the low growth case. The model predicts that economic output grows at 3.5 percent per year in the high growth case, 3.0 percent per year in the reference case, and 2.5 percent per year in the low growth case. Different economic growth scenarios will affect the rate of growth of electricity demand.

13.2 METHODOLOGY

The electric utility industry analysis will consist of NEMS-BT forecasts for generation, installed capacity, sales, and prices.

The NEMS provides reference case load shapes for several end uses by Electricity Market Module (EMM) region. The model uses predicted growth in demand for each end use to build up a projection of the total electric system load growth for each region, which it uses in turn to predict the necessary additions to capacity. The NEMS-BT accounts for the implementation of efficiency standards by reducing the appropriate reference case load shape. The Department determines the size of the reduction using forecasts of changes in distribution transformer losses from the national impacts analysis (Chapter 10).

Since the *AEO2003* version of NEMS forecasts only to the year 2025, DOE must extrapolate its results to 2035 to match the rest of its analysis. The Department will use the approach developed by EIA to forecast fuel prices for the Federal Energy Management Program (FEMP). The FEMP uses these prices to estimate life-cycle costs of federal equipment procurements. For petroleum products, EIA uses the average growth rate for the world oil price over the years 2010 to 2025, in combination with the refinery and distribution markups from the year 2025, to determine the regional price forecasts. Similarly, EIA derives natural gas prices from an average growth rate figure in combination with regional price margins from the year 2025.

13.3 RESULTS FORMAT

Results of the utility impact analysis will include changes in electricity sales, and installed capacity and generation by fuel type, for each candidate standard level, in five-year, forecasted increments extrapolated to the year 2035.

REFERENCES

1. U.S. Department of Energy-Energy Information Administration, *National Energy Modeling System: An Overview 2003*, 2003. Report No. DOE/EIA-0581(2003). <<http://www.eia.doe.gov/oiaf/aeo/overview/index.html>>
2. U.S. Department of Energy - Energy Information Administration, *Annual Energy Outlook 2003: With Projections Through 2025*, January, 2003. Washington, DC. Report No. DOE/EIA-0383(2003). <<http://www.eia.doe.gov/oiaf/aeo>>